TOSHIBA PHOTOCOUPLER GaAs IRED & PHOTO-TRANSISTOR

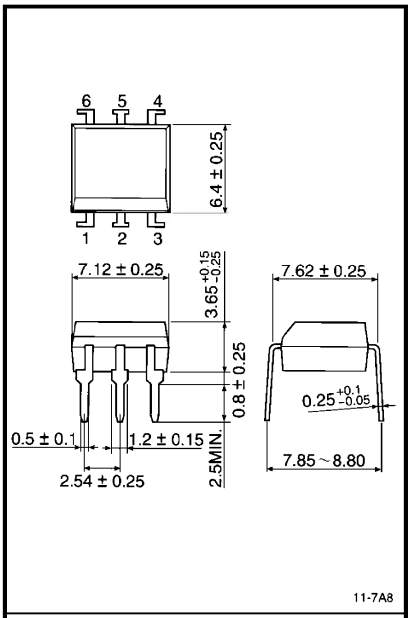
4N38(Short), 4N38A(Short)

AC LINE / DIGITAL LOGIC ISOLATOR.
DIGITAL LOGIC / DIGITAL LOGIC ISOLATOR.
TELEPHONE LINE RECEIVER.
TWISTED PAIR LINE RECEIVER.
HIGH FREQUENCY POWER SUPPLY FEEDBACK CONTROL.
RELAY CONTACT MONITOR.

The TOSHIBA 4N38 (Short) through 4N38A (Short) consists of a gallium arsenide infrared emitting diode coupled with a silicon phototransistor in a dual in-line package.

- Switching Speeds : 3μs (Typ.)
- DC Current Transfer Ratio : 100% (Typ.)
- Isolation Resistance : $10^{11}\Omega$ (Min.)
- Isolation Voltage : 2500Vrms (Min.)
- UL Recognized : UL1577, File No. E67349

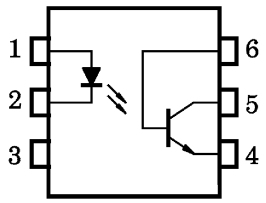
Unit in mm



TOSHIBA 11-7A8

Weight : 0.4g

PIN CONFIGURATIONS (Top view)



1 : ANODE
2 : CATHODE
3 : N.C.
4 : EMITTER
5 : COLLECTOR
6 : BASE

980910EBC1

MAXIMUM RATINGS (Ta = 25°C)

	CHARACTERISTIC	SYMBOL	RATING	UNIT
LED	Forward Current (Continuous)	I_F	80	mA
	Forward Current Derating	ΔI_F / °C	1.07 (*)	mA / °C
	Peak Forward Current (Note 1)	I_{PF}	3	A
	Power Dissipation	P_D	150	mW
	Power Dissipation Derating	ΔP_D / °C	2.0 (*)	mW / °C
	Reverse Voltage	V_R	3	V
DETECTOR	Collector-Emitter Voltage	BV_{CEO}	80	V
	Collector-Base Voltage	BV_{CBO}	80	V
	Emitter-Collector Voltage	BV_{ECO}	7	V
	Collector Current (Continuous)	I_C	100	mA
	Power Dissipation	P_C	150	mW
	Power Dissipation Derating	ΔP_C / °C	2.0 (*)	mW / °C
COUPLED	Storage Temperature	T_{stg}	−55~150	°C
	Operating Temperature	T_{opr}	−55~100	°C
	Lead Soldering Temperature (at 10s)	T_{sol}	260	°C
	Total Package Dissipation	P_T	250	mW
	Total Package Power Dissipation Derating	ΔP_T / °C	3.3 (*)	mW / °C

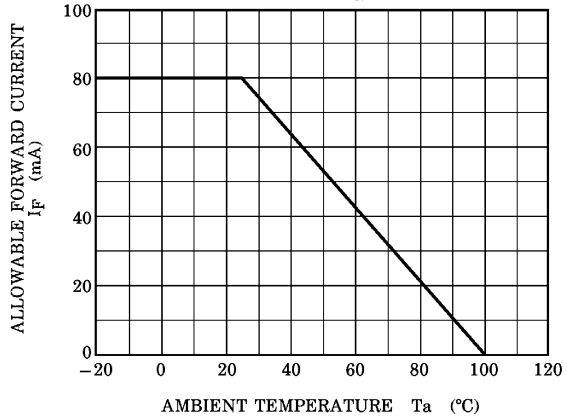
(Note 1) Pulse width 300μs, 2% duty cycle.
(*) Above 25°C ambient.

ELECTRICAL CHARACTERISTICS (Ta = 25°C)

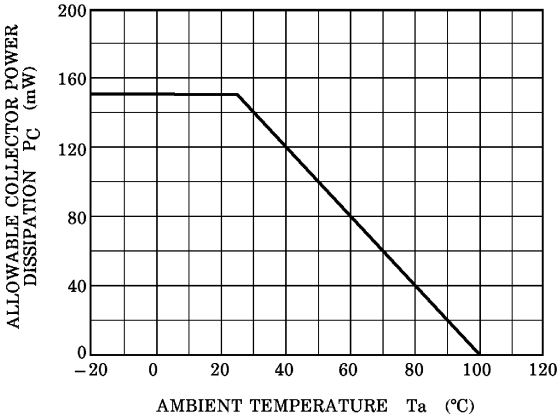
	CHARACTERISTIC		SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
LED	Forward Voltage		V_F	I_F = 10mA	—	1.15	1.5	V
	Reverse Current		I_R	V_R = 3V	—	—	100	μA
	Capacitance		C_D	V = 0, f = 1MHz	—	30	—	pF
DETECTOR	DC Forward Current Gain		h_{FE}	V_{CE} = 5V, I_C = 500μA	—	200	—	—
	Collector-Emitter Breakdown Voltage		$V_{(BR)CEO}$	I_C = 1mA	80	—	—	V
	Collector-Base Breakdown Voltage		$V_{(BR)CBO}$	I_C = 100μA	80	—	—	V
	Emitter-Collector Breakdown Voltage		$V_{(BR)ECO}$	I_E = 100μA	7	—	—	V
	Collector Dark Current		I_{CEO}	V_{CE} = 60V	—	1	50	nA
	Collector Dark Current		I_{CBO}	V_{CB} = 60V	—	0.1	20	nA
	Collector-Emitter Capacitance		C_{CE}	V = 0, f = 1MHz	—	10	—	pF
COUPLED	Current Transfer Ratio		I_C / I_F	I_F = 10mA, V_{CE} = 10V	10	100	—	%
	Collector-Emitter Saturation Voltage		$V_{CE(sat)}$	I_F = 20mA, I_C = 4mA	—	—	1.0	V
	Capacitance Input to Output		C_S	V_S = 0, f = 1MHz	—	0.8	—	pF
	Isolation Resistance		R_S	V_S = 500V, R.H. ≦ 60%	10^{11}	—	—	Ω
	Isolation Voltage		BV_S	AC, 1 minute	2500	—	—	Vrms
		4N38	BV_S (*)	AC, peak	1500	—	—	Vpk
		4N38A			2500	—	—	
		4N38A		AC, 1 second	1775	—	—	Vrms
	Turn-On Time		t_{ON}	V_{CE} = 10V, I_C = 2mA	—	3	—	μs
	Turn-Off Time		t_{OFF}	R_L = 100Ω	—	3	—	

(*) JEDEC registered minimum BV_S, however, TOSHIBA specifies a minimum BV_S of 2500Vrms, 1 minute.

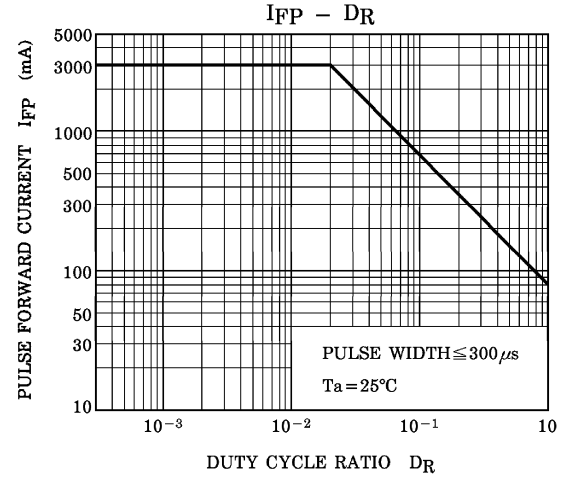
$I_F - T_a$



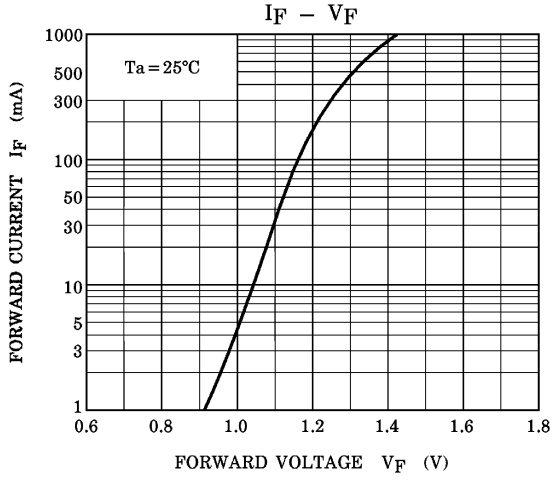
$P_C - T_a$



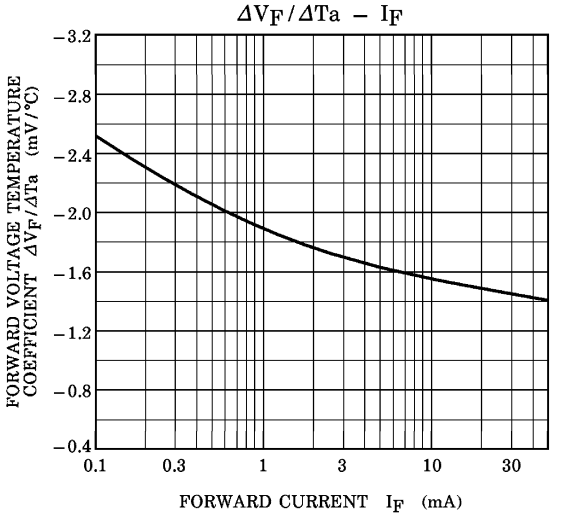
$I_{FP} - D_R$



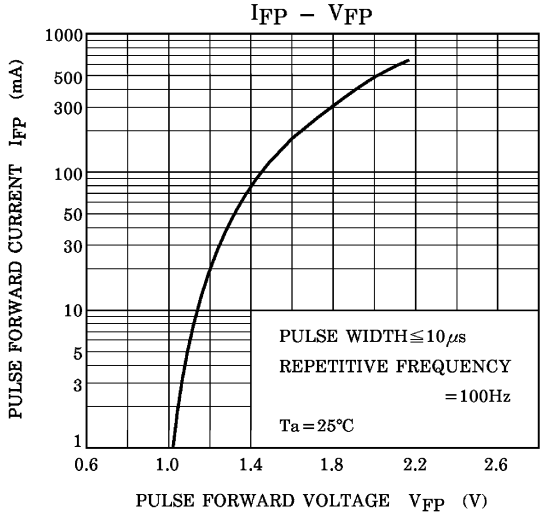
$I_F - V_F$



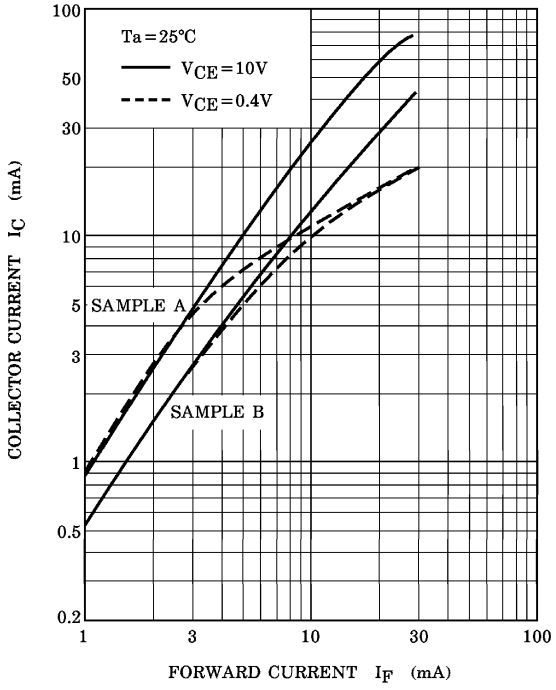
$\Delta V_F / \Delta Ta - I_F$



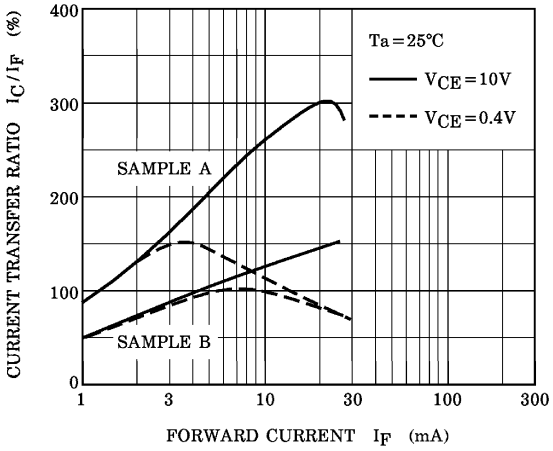
$I_{FP} - V_{FP}$



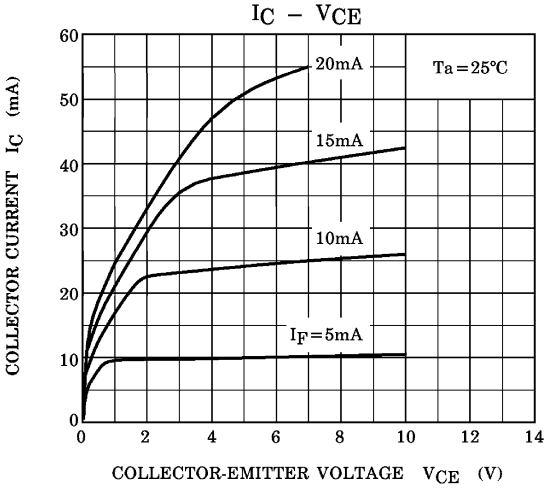
$I_C - I_F$



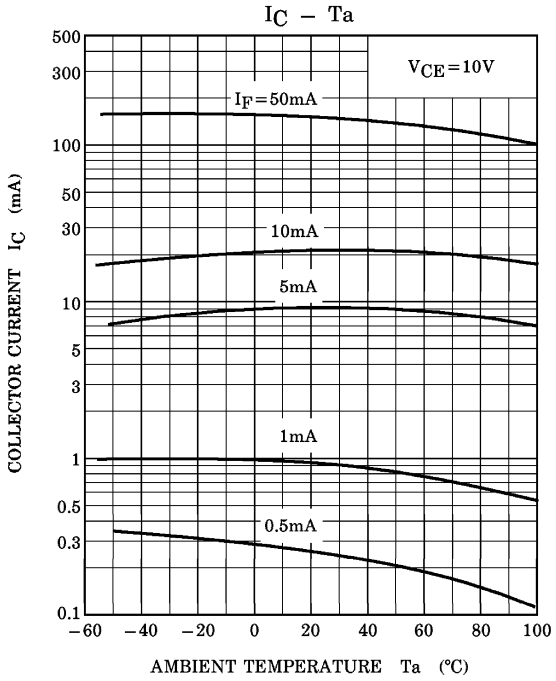
$I_C / I_F - I_F$



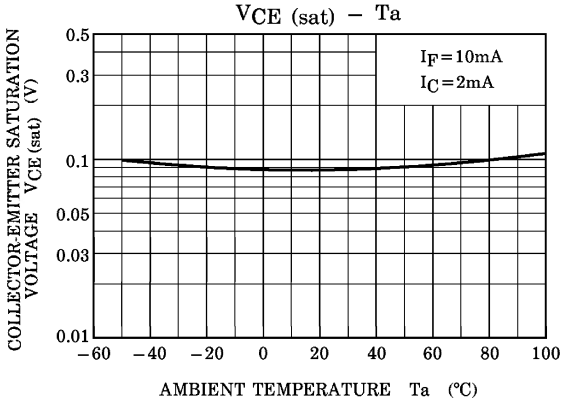
$I_C - V_{CE}$



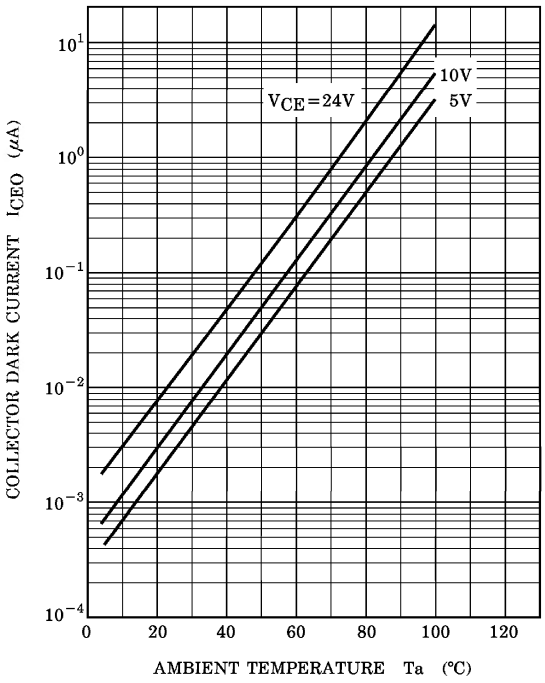
$I_C - Ta$



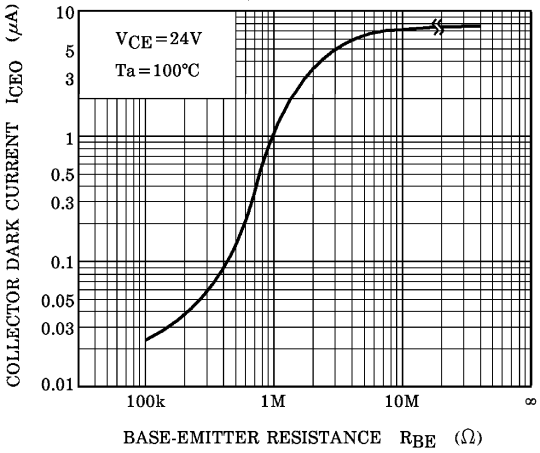
V_{CE} (sat) − Ta



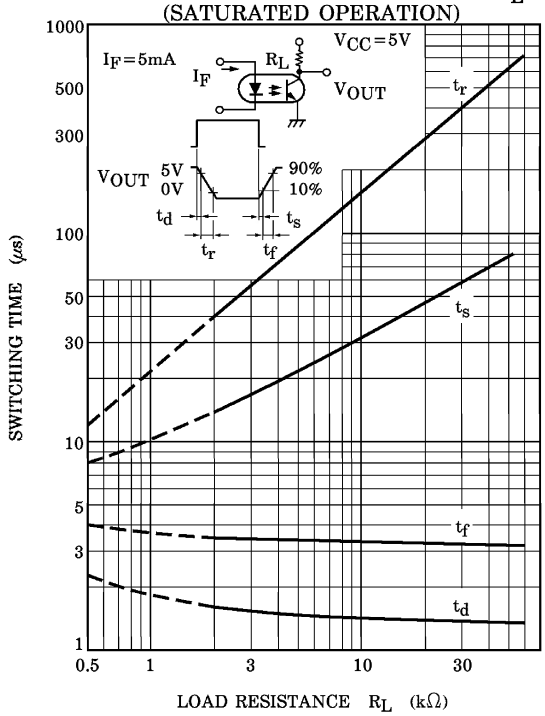
I_{CEO} – Ta



I_{CEO} – R_{BE}



SWITCHING CHARACTERISTICS – R_L
(SATURATED OPERATION)



SWITCHING CHARACTERISTICS – R_{BE}
(SATURATED OPERATION)